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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DI WEI, THOMAS H. VANDERSPURT,
RAKESH RADHAKRISHNAN, STEPHEN O. HAY,
TIMOTHY N. OBEE, and
WAYDE R. SCHMIDT

Appeal 2009-009788
Application 10/736,921
Technology Center 1700

Before EDWARD C. KIMLIN, ADRIENE LEPIANE HANLON, and
CHUNG K. PAK, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1 through 22, 24 through 34, 36, and 37, all of the pending claims in the above-identified application. We have jurisdiction under 35 U.S.C. §§ 6 and 134.

STATEMENT OF THE CASE

The subject matter on appeal is directed to
a multi-layer photocatalyst/thermocatalyst coating that
decomposes ozone and oxidizes gaseous contaminants,
including volatile organic compounds, low polarity organic
molecules, and carbon monoxide, that absorb onto the
photocatalytic surface to form carbon dioxide, water, and other
substances. [(Spec. 1, para. 1.)]

Details of the appealed subject matter are recited in representative claims 1,
22, 24, and 27¹ reproduced from the Claims Appendix to the Appeal Brief as
shown below:

1. A purification system comprising:

a substrate; and

a layered catalytic coating applied on said substrate,
wherein said layered catalytic coating comprises a first layer of
a photocatalytic coating that is operative to react with a target
substance to produce a first intermediate substance, a second
layer of a photocatalytic metal loaded metal compound coating
that is operative to react with the first intermediate substance to
form a second intermediate substance, and a third layer of a
thermocatalytic coating that is operative to react with the
second intermediate substance to produce a product substance.

¹Appellants separately argue the limitations recited in claims 1, 22, 24, and 27 (App. Br. 5-7). Therefore, for purposes of this appeal, we select claims 1, 22, 24, and 27 from the claims on appeal and decide the propriety of the Examiner's §§ 112 and 103(a) rejections set forth in the Answer based on these claims alone. See 37 C.F.R. § 41.37(c)(1)(vii) ("When multiple claims subject to the same ground of rejection are argued as a group by appellant, the Board may select a single claim from the group of claims that are argued together to decide the appeal with respect to the group of claims as to the ground of rejection on the basis of the selected claim alone.").

22. A fluid purification system comprising:

a container having an inlet and an outlet;

a porous substrate inside said container;

a device for drawing a fluid into said container through said inlet, flowing said fluid through said porous substrate, and expelling said fluid out of said container through said outlet;

a layered catalytic coating applied on said substrate, and said layered catalytic coating includes a first layer of a photocatalytic metal oxide coating, a second layer of a photocatalytic noble metal loaded metal oxide coating, and a third layer of a thermocatalytic coating, and said third layer is gold/metal oxide; and

an ultraviolet light source to activate said layered catalytic coating, and photons from said ultraviolet light source are absorbed by said layered catalytic coating to form a reactive hydroxyl radical, and said reactive hydroxyl radical oxidizes contaminants in said fluid that are adsorbed onto said layered catalytic coating when activated by said ultraviolet light source to water and carbon dioxide in the presence of water and oxygen.

24. A purification system comprising:

a first substrate having a first coating of one of titanium dioxide and metal compound/titanium dioxide;

a second substrate having a second coating of metal/titanium dioxide; and a third substrate having a third coating of metal oxide/titanium dioxide.

27. The purification system as recited in claim 24 wherein said third substrate is distal to an inlet of said

purification system, and said first substrate and said second substrate are proximate to said inlet of said purification system.

As evidence of obviousness of the claimed subject matter, the Examiner relies on the following prior art references:

Kobayashi	US 6,368,668 B1	Apr. 9, 2002
Reisfeld	US 2003/0021720	Jan. 30, 2003

Appellants request review of the following grounds of rejection² set forth at pages 5 through 7 of the Answer:

- 1) Claims 1 through 21, 28 through 30, 34, 36, and 37 under 35 U.S.C. § 112, first paragraph, as lacking written descriptive support in the application as originally filed for the presently claimed subject matter;
- 2) Claims 22 and 31 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Kobayashi and Reisfeld; and
- 3) Claims 24 through 27, 32, and 33 under 35 U.S.C. § 103(a) as unpatentable over Reisfeld and Kobayashi. (*See* Ans. 3-6 and App. Br. 3-4 and Reply Br. 1)

ISSUES AND CONCLUSIONS

With respect to the § 112 rejection, the dispositive question is: Have Appellants identified reversible error in the Examiner's finding that that the application disclosure as originally filed does not reasonably convey to one of ordinary skill in the art that the inventors had possession of the claimed functionally defined limitation "a first layer of a photocatalytic coating that

² The rejection of claims 1 through 21, 28 through 30, 34, 36, and 37 under 35 U.S.C. § 112, first paragraph, as lacking an enabling disclosure for the presently claimed subject matter was withdrawn and is no longer subject of this appeal. (Ans. 3)

is operative to react with a target substance to produce a first intermediate substance, a second layer of a photocatalytic metal loaded metal compound coating that is operative to react with the first intermediate substance to form a second intermediate substance, and a third layer of a thermocatalytic coating that is operative to react with the second intermediate substance to produce a product substance” in claim 1? On this record, we answer this question in the negative.

With respect to the § 103(a) rejections of claims 22, 24 through 27, 31, 32 and 33 based on the combined teachings of Kobayashi and Reisfeld, the dispositive question is: Have Appellants identified reversible error in the Examiner’s determination that one of ordinary skill in the art would have been led to employ the claimed multi-layered coatings of photocatalytic materials, as suggested by Kobayashi, in the first, second and third photocatalytic filters (porous substrates) in Reisfeld’s purification system, with a reasonable expectation of successfully purifying the air via oxidizing and eliminating, for example, odors and volatile organic compounds in the air? On this record, we answer this question in the negative.

ANALYSIS, FINDINGS OF FACT, AND PRINCIPLES OF LAW

I. CLAIMS 1 THROUGH 21, 28 THROUGH 30, 34, 36, AND 37 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH:

As our reviewing court stated in *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991):

“The purpose of the ‘written description’ requirement [under 35 U.S.C. § 112, first paragraph,] is broader than to merely explain how to ‘make and use’; the applicant must also convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of *the invention*.

The invention is, for purposes of the ‘written description’ inquiry, *whatever is now claimed.*” “One shows that one is ‘in possession’ of the invention by describing the invention, *with all its claimed limitations*, not that which makes it obvious.” *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997) (emphasis added; original emphasis not reproduced). “Although the exact terms need not be used *in haec verba*,..., the specification must contain an equivalent description of the claimed subject matter.” (*Id.*)

Here, there is no dispute that the limitation “a first layer of a photocatalytic coating that is operative to react with a target substance to produce a first intermediate substance, a second layer of a photocatalytic metal loaded metal compound coating that is operative to react with the first intermediate substance to form a second intermediate substance, and a third layer of a thermocatalytic coating that is operative to react with the second intermediate substance to produce a product substance” was introduced into claim 1 during the prosecution of the above-identified application. (Compare Ans. 3, 4 and 8, with App. Br. 5 and Reply Br. 1-2). Nor is there any dispute that this new limitation, as properly interpreted, encompasses a first layer of a photocatalytic material capable of converting a first compound into a first intermediate compound, a second layer of a photocatalytic material capable of converting the first intermediate compound into a second intermediate compound, and a third layer of a thermocatalytic material capable of converting the second intermediate compound into a final compound, respectively. (Compare Ans. 3, 4 and 8, with App. Br. 5 and Reply Br. 1-2). Rather, Appellants contend that written descriptive support for such new limitation can be found at paragraphs 32

and 37 of the Specification as originally filed (App. Br. 5). According to Appellants, the Specification as originally filed describes a second layer of photocatalytic material producing carbon dioxide and a third layer of thermocatalytic material converting carbon dioxide into a different product compound (*id.*).³

However, as correctly found by the Examiner at page 8 of the Answer, nowhere in paragraphs 32 and 37 of the Specification is there any written descriptive support for a second layer of a photocatalytic material capable of further converting the first intermediate compound to a second intermediate compound and a third layer of a thermocatalytic material capable of further converting the second intermediate compound to a final compound. The original paragraphs of the Specification relied upon by Appellants only disclose a second layer of a photocatalytic material capable of oxidizing low polarity organic molecules to carbon dioxide and a third layer of a thermocatalytic material capable of oxidizing carbon monoxide to carbon dioxide. Thus, on this record, Appellants have not directed us to any original disclosure which implicitly, explicitly, or equivalently describes photocatalytic and thermocatalytic materials capable of further converting carbon dioxide into another compound as alleged. Nor have Appellants

³ Appellants' arguments and evidence introduced for the first time in this appeal at pages 1 and 2 of the Reply Brief are not considered. All arguments and evidence not timely raised or relied upon in the principal Appeal Brief are considered waived. *See, e.g.,* 37 C.F.R. § 41.37(c)(1)(vii); *Optivus Technology, Inc. v. Ion Beam Applications S.A.*, 469 F.3d 978, 989 (Fed. Cir. 2006) (argument raised for the first time in the Reply Brief that could have been raised in the opening brief is waived). *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1320–21 n. 3 (Fed. Cir. 2005); *In re Watts*, 354 F.3d 1362, 1366–68 (Fed. Cir. 2004).

directed us to any original disclosure which implicitly, explicitly, or equivalently describes photocatalytic and thermocatalytic materials capable of promoting reactions or conversions other than oxidation.

Accordingly, we determine that Appellants have not identified any reversible error in the Examiner's finding that the subject matter presently recited in claims 1 through 21, 28 through 30, 34, 36, and 37 does not have written descriptive support in the application disclosure, as originally filed, within the meaning of the first paragraph of 35 U.S.C. § 112.

II. CLAIMS 22, 24 THROUGH 27, 31, 32 AND 33 UNDER 35 U.S.C. § 103(a):

Appellants do not dispute the Examiner's findings at pages 5 and 6 of the Answer that

Reisfeld teaches in a photocatalytic fluid purification system [corresponding to] the recited limitations of a photocatalytic purifier having at least one catalytic coated substrate with which the circulated air comes into contact and at least one UV light source disposed near the substrate for illuminating thereof for eliminating odors, volatile organic compounds and bioaerosols in the circulated air (Figs. 1 and 4 and paragraph 20).

....

Reisfeld, a reference applied above, discloses in the photocatalytic fluid purification system the provision of three honeycomb photocatalytic filters (12, 14, 16[, 18]) [corresponding to the claimed first, second and third substrate] as shown in Fig. 1, each filter being coated with any suitable photocatalyst coating (paragraph 24).

Reisfeld also illustrates photocatalytic filters (14) and (16) proximate to the inlet of the fluid purification system and a photocatalytic filter (18) distal to the inlet of the fluid purification system as required by claim 27 (Fig. 1).

As recognized by the Examiner at pages 5 and 6 of the Answer, Reisfeld does not specifically mention employing the claimed specific photocatalytic and thermocatalytic⁴ coatings. However, the Examiner finds, and Appellants do not dispute, that Kobayashi teaches applying multi-layered coatings formed of photocatalytic compositions inclusive of those used in the claimed photocatalytic and thermocatalytic layers on a substrate for the purpose of purifying gases and eliminating odor via oxidizing bacteria, mold, and volatile organic compounds upon light irradiation. (Compare Ans. 5-6 with App. Br. 5-7 and Reply Br. 1-2.)

Given that any suitable photocatalytic coatings can be used in the photocatalytic filters corresponding to the claimed first, second and third porous substrates in Reisfeld's purification system, we concur with the Examiner that one of ordinary skill in the art would have been led to employ the multi-layer coatings formed of photocatalytic compositions inclusive of those claimed, as taught by Kobayashi, on Reisfeld's photocatalytic filters, with a reasonable expectation of successfully purifying gases and eliminating odor via oxidizing bacteria, mold, and volatile organic compounds upon light irradiation on the photocatalytic materials. *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (*quoting Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)) ("[W]hen a patent 'simply arranges old

⁴ The so-called "thermocatalytic coating" is another name for a photocatalytic coating since both the claimed thermo and photocatalytic coatings are activated in the same manner, i.e., upon light irradiation.

elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious.")

Accordingly, we determine that Appellants have not identified any reversible error in the Examiner's determination that one of ordinary skill in the art would have been led to employ the claimed multi-layered coatings of photocatalytic materials, as suggested by Kobayashi, in the first, second and third photocatalytic filters (porous substrates) in the claimed manner in Reisfeld's purification system, with a reasonable expectation of successfully purifying the air via oxidizing and eliminating, for example, odors and volatile organic compounds in the air within the meaning of 35 U.S.C. § 103(a).

ORDER

For the reasons set forth above and in the Answer, the decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

kmm

CARLSON, GASKEY & OLDS, P.C.
400 WEST MAPLE ROAD
SUITE 350
BIRMINGHAM, MI 48009